



CHAPTER 3

DEMAND, SUPPLY AND THE CONCEPT OF UTILIZATION

In Bangladesh the demand for hospital beds at the Thana health complexes are less than the supply, and thus underutilized but in the District hospitals the demand for beds are more than the supply and thus overutilized. In both cases the demand and the supply are not in equilibrium, as a result there are some impacts on utilization, either underutilization or overutilization. This thesis attempts to propose a methodology to assess the impacts of the underutilization and overutilization.

3.1 Demand and Supply

3.1.1 Demand:

The demand for a commodity is the amount of it that a consumer will purchase or will be ready to take off from the market at a various given prices at a given moment of time. This demand in economics implies both the desire to purchase and the ability to pay for a good or service.

Demand for a good is determined by several factors, such as, changes in the price of the related goods, income of the people, the number of consumers in the market, tastes and preferences of the consumers, income distribution, changes in propensity to consume, consumers expectation with respect to future price.

Law of demand :

The law of demand expresses the relationship between price and quantity demanded. The law of demand or functional relationship between price and quantity demanded is one of the best known and most important laws of economic theory.

According to the law of demand, other things being equal, if the price of a commodity falls, the quantity demanded of it will rise and if the price of the commodity rises, its quantity demanded will decline. When the price of a commodity falls, the consumer can buy more quantity of commodity with his given income.

Exception to the Law of Demand :

Some consumers measure the utility of a commodity entirely by

its price i.e, for them the greater the price of commodity, the greater its utility. Diamonds are often given as an example in this case. The diamond is considered as a prestige goods in the society and for the upper strata of the society the higher the price of diamonds, the higher the prestige value of them and therefore, the greater utility of desirability of them. In this case, the consumer will buy less of the diamond at a low price because with the fall in price its prestige value will go down. On the other hand, when the price of diamond goes up, their prestige value will go up and therefore, their utility and desirability. As a result at higher price the quantity demanded of diamond by a consumer will rise.

Elasticity of Demand for Health Services :

Consumers of certain health services, such as hospital and physician services, are not very responsive to price changes, because the consumption of hospital services are unpredictable, uncertain and unavoidable issue, when a person gets sick, he wants to get relieve from pain and wants to get cure at any price. When a person is able to pay having no sickness, he does not consume hospital services, whatever low may be the price. An increase in price will not reduce the quantity demanded very much, and a decrease in price will not increase it much. In other words, the elasticity of demand in health care services are low or inelastic.

Figure: 3.1 Demand for Health Care.

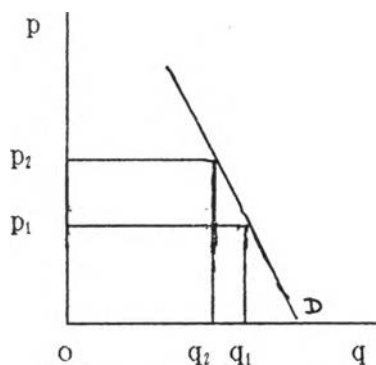


Figure 3.1 illustrates the impact of price change on demand. An increase in price from p_1 to p_2 decreases quantity demanded from q_1 to q_2 . Suppose p_1 and p_2 are US \$ 4 and US \$ 5 respectively, for a visit to a doctors office and that q_1 and q_2 are ten visits and nine visits respectively, per month. An increase in price of 25% $[(4-5)/4]$ reduces the number of visits to the doctors office from ten to nine visits per month - a ten percent decrease in quantity demand. The price elasticity of demand is 0.40 which is said to be inelastic, i.e, the elasticity is less than <1 .

Other Determinants of Demand :

Demand schedule and the law of demand state the relationship between price and quantity demanded by assuming "other things remaining the same" when there is a change in these other things, the whole

demand curves undergoes a change. In other words, these other things determine the position and level of demand curve. As a result of the change in these factors or determinants, the demand curve will shift to the left or right as the case may be. The following are the factors which determine the demand of goods or services.

Changes in the Prices of Related Goods:

Demand for a good is also affected by the prices of other goods especially those which are related to it as substitutes or complements. When we draw the demand curve for a good we take the prices of related goods as remaining constant. Therefore, when the price of related goods, substitutes or complements, change the whole demand curve would change its position; it will shift upwards or downwards as the case may be. When the price of substitute for a good falls, the demand for that good will decline and when the price of the substitute rises, the demand for that good will increase. For example, when the price of the injection falls, the consumers would demand less of tablet than before. Tablet and injection are very close substitutes, therefore when injection becomes cheaper, the consumers substitute injection for tablet and as a result the demand for tablet declines. The goods which are complementary with each other, the change in the price of any of them would affect the demand of the other. When the price of treatment in private hospital falls, the demand for them will increase which in turn will increase the demand of drugs.

Income of the People:

Demand for goods also depends upon the income of the people. The greater the income of the people, the greater will be their demand for goods. In drawing the demand schedule or the demand curve for a good we take incomes of the people as given and constant. The greater income means the greater purchasing power. Therefore, when the incomes of the people increase, they can afford to buy more. It is because of this reason that the increase in income has a positive effect on the demand of a good.

When the incomes of the people fall they would demand less of the goods and as a result the demand curve will shift to the left. For instance, during the planning period in India the incomes of the people have greatly increased owing to the large investment expenditure on the development schemes by the government and the private sector. As a result of this increase in income, the demand for food grains has greatly increased which has resulted in the food problem. Likewise, when because of draught in a year the agricultural production greatly falls and the income of the farmers decline. As a result of the decline in incomes of the farmers, they demand less of cotton cloth and other manufactured products. With an increase in income the people will shift their demand for hospital service from public hospital to private hospital.

Taste and Preferences of Consumers:

An important factor which determines the demand for a good is the tastes and preferences of the consumers for it. A good for which consumers tastes and preferences are greater, its demand would be large and its demand curve will lie at a high level. People's tastes and preferences for various goods often changes and as a result there are changes in demand for various goods due to change in fashion and also due to the pressure of advertisements by the manufacturers and sellers of different products.

In respect of hospital care the demand is determined by the taste and preference of the consumer in respect of quality of care, accessibility, availability of modern equipment, technology and satisfaction on hospital services. Regarding hospital care services, the people do not prefer to get the services from Thana health complex and remains underutilized. On the other hand people prefer to get the services from the District hospital and creates overutilization.

Number of Consumers in the Market:

Market demand for a good is obtained by adding up the individual demand of the present as well as prospective consumers or buyers of a good at a various possible prices. The greater the number of consumers of a good, the greater the market demanded for it. Now the question arises on what factors the number of consumers of a good depend. If the consumer substitute one good for another, then the number of consumer of that good which has been substituted by the other will decline and for the good which has been used in place of the other, the number of consumers will increase. Besides, when the seller of a good succeeds in finding out new markets for these good and as a result the market for his good expands, the number of consumers of those good will increase. Another important cause of the increase in the number of consumers is population growth.

Income Distribution:

Distribution of income in a society also affects the demand for goods. If the distribution of income is more equal, then the propensity to consume of the society as a whole will be relatively high which means greater demand for goods, such as consumer goods like food, clothing, education, housing. On the other hand, if the distribution of income is unequal, then the propensity to consume of the society will be relatively less, for the propensity to consume of the rich people is less than that of the poor people. Consequently, with more unequal distribution of income, the demand for consumer goods will be comparatively less. This is the effect of the income distribution on the propensity to consume and demand for consumer goods. But the change in the distribution of income in the society would affect the demand for various goods differently. If progressive taxes are levied on the rich people and the money so collected is spent on providing employment to the poor people, the distribution of income would become more equal and with this there would be a transfer of purchasing power from the

rich to the poor. As a result of this, the demand for goods which are generally purchased by the poor will increase and, on the other hand, the demand for those goods which are usually consumed by the rich will decrease.

Change in Propensity to Consume:

People's propensity to consume also affects the demand for them. The income of the people remaining constant, if their propensity to consume rises then out of a given income they would spend a greater part of it. With the result that the demand for goods will increase. On the other hand, if the propensity to save of the people increases, i.e., the propensity to consume declines, then the consumers would spend a smaller part of their income on goods with the result that the demand for good will decrease. Therefore, with income remaining constant, change in propensity to consume of the people will bring about a change in the demand for goods.

Expectation with regard to Future Prices and Income:

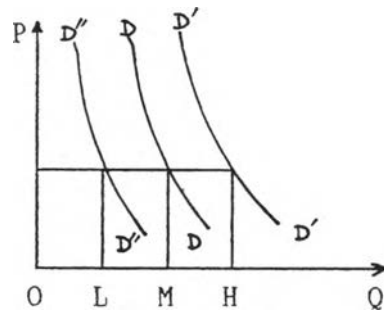
Another factor which influences the demand for goods is consumers' expectations with regard to future prices of the goods. If due to some reasons, consumers expect that in the near future prices of the goods would rise, then they would demand greater quantities of the goods so that in the future they should not have to pay higher prices. Similarly, when the consumers hope that in the future they will have good income, then in the present they will spend greater part of their income. Thus demand for goods will increase.

Increase and Decrease in Demand:

Figure 3.2 When the price of a good falls, quantity demanded of it rises, and when its price rises, its quantity demanded falls, other thing remaining the same. When as a result of changes in price, the quantity demanded rises or falls, extension or contraction in demand is said to have taken place. When other determinants of demand such as taste, income, propensity to consume and prices of the related goods remain constant. The contraction in demand implies the fall in quality demanded means the whole demand curve shifts to the left. Similarly extension of demand implies the rise of quality demanded as a result of fall in price, increase in demand means the demand curve shifts to the right.

Original demand curve is DD. If there is a favorable change in the factors determining the demand, the demand curve for the good shifts upward to $D'D'$. Increase in demand has occurred. When demand curve for the good is DD, at price OP, OM quantity of the good is demanded. But with the demand curve $D'D'$, at the same prices OP, a greater quantity OH is demanded. Likewise, at other prices also, at the demand curve $D'D'$, more quantity is demanded than at the demand curve DD.

Figure: 3.2 Increasing Demand



In brief, increase in demand occurs due to the following reasons:-

- i) Consumers' income increases;
- ii) Prices of the substitutes of the good in question have risen;
- iii) Prices of the complementary goods have fallen;
- iv) The fashion for a good increases or peoples' taste and preferences become more favorable for the good;
- v) Propensity to consume of the people has increased;
- vi) Owing to the increase in population and as a result of expansion in market, the number of consumers of the good has increased.

And vice versa when there is a leftward shift in demand.

3.1.2 Supply:

Supply of the commodity is the schedule of the quantity of a commodity that would be offered for sale at all possible prices at any one point of time or during any one period of time, for example a day, a week, a month and so on; supply means the quantity which is actually brought into the market.

Law of Supply:

Supply of commodity is functionally related to its price. The law of supply relates to this functional relationship between price of a commodity and its supply. In contrast of the change in quantity demanded in response to the change in price, the quantity supplied generally varies directly with its price. That is, the higher the price, the larger the quantity supplied.

It may be noted that, if the price falls too much, supply may dry up altogether. The price below which the seller will refuse to sell is called the reserve price. At this price, the seller buys his own stock as it were. There are several factors which govern the reserve price of a seller (Ahuza,1988).

- 1) The reserve price will depend on the perishability of goods. The greater the perishability, the lower is the reserve price.

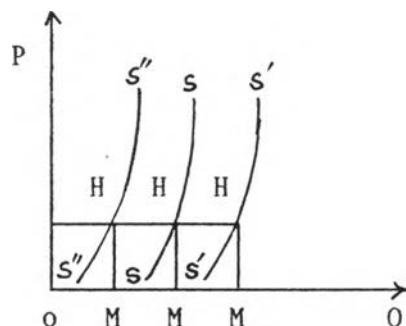
- 2) In case of goods which are not perishable, the reserve price will depend upon the sellers estimate of the future price.
- 3) It will also depend upon the future costs. If the costs are expected to fall, the reserve price will be lower, and vice versa.
- 4) The reserve price also depends on change in inventory cost. The period for which the stocks have to be held is therefore, important. The longer is the period, the lower will be the reserve price.

It has been observed from the experiences in the real world that price of a product and quantity supplied of it by firms producing it are directly related with each other, that is at a higher price more is supplied and vice versa, other things remaining the same.

Increase and Decrease in Supply:

Other things being equal there is unique demand and supply schedule at any given moment. Supply is said to increase when more is offered for sale at the same price or the same quantity is offered at a lower price and vice versa when supply is said to decrease. This is illustrated in Figure 3.3 where $S'S'$ shows an increase in supply and $S''S''$ shows a decrease in supply.

Figure : 3.3 Change in Supply



Factors Determining Supply :

The quantity supplied varies directly with price of a product. In economic theory whereas the effect of changes in price of a product on the quantity supplied of it is depicted and explained by movement along a given supply schedule or curve, the effect of other factors is represented by the changes or shifts of the entire supply curve. While making a supply curve we assume that these other factors remain the same. Thus when these other factors changes, they cause a shift in the entire supply curve. The factors other than price which determine supply are as follows:

Production Technology: The change in technology affects the supply function by altering the cost of production. If there is an improvement in production technology used by the firm, the cost of production declines and consequently the firms would supply more than before at a given price. That is, the supply would increase and thus the supply curve would shift to the right.

Price of Factors of Production: Change in prices of factors of productions or resources also cause a change in cost of production and consequently bring about a change in supply. For example, if either wage increase or prices of raw materials and fuel go up, the unit cost of production will rise. With higher unit cost of production, less would be supplied than before at various given prices, this implies that supply curve will shift to the left.

Price of Other Products: Any change in the price of other products would influence the supply of a product by causing substitution of one product to another.

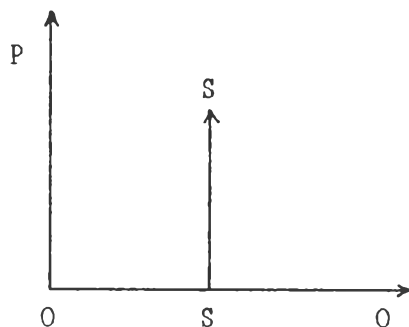
Number of Producers : If the number of firms producing a product increases, the market supply of the product will increase causing a rightward shift in the supply curve.

Future Price Expectations : The supply of a commodity in the market at any time is also determined by sellers expectations of future prices. If, as happens during inflationary periods, sellers expect the prices to rise in future, they would reduce supply of a product in the market and would instead hoard the commodity. The hoarding of huge quantities of goods by traders is an important factor in reducing their supplies in the market and thus causing further rise in their prices.

Elasticity of Supply : Elasticity is the relative measure of responsiveness of quantity supplied of a commodity to the change in its price. The greater the responsiveness of quantity supplied of a commodity to the changes in its price, the greater its elasticity in supply. When a small fall in price leads to a large contraction in supply, the supply is comparatively elastic. But when a big fall in price leads to a very small contraction in supply, the supply is said to be comparatively inelastic, at least in a short run,

In short run, the supply of some health care services such as hospital building, bed, expensive machineries could not be changed with the rise or fall of price. In the context of Bangladesh the hospital service is free and the number of beds which represents the supply of services remains constant and hence highly inelastic.

Figure : 3.4 Perfectly Inelastic Supply



3.2 Demand for and Supply of Hospital Services

In case of hospital services the demand is determined mainly by a) consumers income b) consumers taste and choice c) number of consumers in the market, while the supply of beds in Thana health complex and the District hospital are fixed, but the hospitalization is an uncertain event. The patients needs better hospital services, in that case demand is determined by taste and choice. When the patient or the consumer has high income, he wants to get the service from the District hospital.

From the above it is clear that the quantity of demand for hospital services is determined by some important factors such as, the price of hospital services, price of other commodities, expected waiting time of the patients and their attendants, income of the patients or the parents of the patients, distance from hospital, and the quality of service which ultimately leads to satisfaction of the patients. Because the consumption of hospital services are unpredictable, uncertain and unavoidable issue, when a person gets sick, he wants to be relieved from pain and wants to get cure at any price, when a person have the ability to pay but not sick, he do not consume hospital services, whatever low the price is.

3.2.1 Factors Affecting Hospital Utilization :

Hospital utilization is affected by two sources , On the supply side, an increase in the number of beds could significantly alter both the admission rate and the average length of stay i.e, hospital bed utilization. On the demand side, the utilization depends on some factors such as patient factor, provider factor, and organizational factor.

This is supported by Anderson (1973) who described four sets of factors influence the utilization of health services.

The first set arises from demographic characteristics of the population such as age, race and income. The second set has to do with organization of health services. Ecological factors such as distance comprise the third set, while psychological factors such as the

influence of friends and neighbors make up the fourth set of variables.

In sum, factors have influence over hospital utilization are a) hospital bed to population ratio b) unemployment c) income of the people d) education e) different age group f) migration of people from rural to urban areas g) ethnic composition and h) urbanization. These are described below

Unemployment:

Unemployment has effect on income and limited job opportunities have lower per capita income level. This affects the ability of persons to pay for hospitalization.

Counties with limited job opportunities which have lower per capita income levels. This effects the ability of persons residing in this counties to pay for hospitalization. Moreover, fewer health services are generally available in areas experiencing severe unemployment problem (Anderson 1973). So, unemployment and lower income has some affect with hospital utilization.

Income:

The admission rate among the lowest income group is slightly higher than the higher income group and the median family income is the important predictor to hospital utilization.

Anderson (1973) referred to Andersen and Anderson (1967) who studied the relationship between, variation in the relationship of hospital admission rates to family income overtime. They found that the admission rate among the lowest income group had a slightly higher than the higher income group. In their study they predict patient days per thousand population. Income, specifically median family income, to be an important predictor of state hospital utilization rates.

Education :

Education has been found to be related to hospital utilization. In fact education makes one conscious about health and may receive hospital services in the outpatient department, but the bed utilization also depends on the advice of the physician, nature and severity of illness, etc. Education alone may not be responsible for utilization of hospital beds. Average length of stay also depends on the nature and severity of illness. So, the hospital utilization may have some association with the education.

Anderson(1973) referred to Rosenthal,(1965) who studied on relationship between education and hospital utilization and found that there is a positive association between education and hospital utilization. Education was found to be positively associated with both admission rates and the length of stay.

Education is also associated with the other variables. Income and employment opportunities increases markedly with education. Also hospitals are more likely to be located in areas where the population is better educated and resources are available to support various health services (Anderson 1973).

Age :

Age is an important determinant for hospital admission where utilization rate among the elderly is high, but the average length of stay is low. Because of less immunity the elderly gets sick frequently, but most of the elderly suffer from chronic diseases like diabetes, hypertension. These patients do not stay in the hospital longer and the length of stay in the hospital is shorter.

Anderson (1973) referred to study of Andersen and Anderson (1973) found that hospital admission rates and patient hospital days rose appreciably for the elderly, while during the same period admission rate declined among children.

Migration :

Migration of people to the urban area is the cause of over population which results in low housing condition and malnutrition and leads to some diseases and utilization of hospital services.

Population changes resulting from migration also have important effects on the variables like education, income, employment and age. Countries that experience out migration for long periods of time tend to have older, poorly educated population. Income levels are generally lower among persons residing in these countries as are the levels of health services available to them.

Ethnic Composition :

Anderson (1973) referred to the study of Feldstein and Germann on ethnic composition and hospital utilization, they found that the ethnic composition of population also has a major effect on hospital utilization. Available data indicate nonwhites do not utilize health services as frequently as whites. This finding reflects differences in education, income, and availability of health services among others.

In the context of Bangladesh, there is no white and non-white ethnic groups, but there are some tribal people who have generally less education and income, they prefer local herbal medicine and do not use the hospital services that much, it is in very small areas of the country, which do not affect the total utilization pattern.

Urbanization :

Percentage of urbanization is an important characteristic of the population that affects the use of hospitals. In the urban areas, the percentage of able and adult people are more than the children and

elderly people, they have more education, income, hygienic food and naturally they get sick more frequently the other two groups, as a result they utilize less hospital services.

Differences in admission rates are also apparent between rural and urban areas. The lowest admission rates occurred among persons residing in urban areas. Primary effect of this variable appears to be on average length of stay whereas it has little or no effect on admission rate.

Sector of Production :

Admission rates were highest among rural non-farm population, lowest among urban dwellers. Persons residing in rural farm areas had admission rates that were intermediate between these two groups. One possible explanation for this lower rate for agricultural communities may have to do with family structure. Families in these communities may provide a substitute for the care available to inpatients in the hospital. In the rural areas, the able persons are engaged in farm activities and get less sickness, the children, elderly and able persons who are not related with farm activities get more sickness, and utilize more hospital services. As a result the admission rates among the non-farm population is higher. Most of the urban inhabitants belongs to working age group or middle age group who gets less sickness, but the elderly and the children who are less immune and are exposed to diseases are less in number of inhabitants in the urban area. As a result admission rate among the urban population is lowest.

3.2.2 Index of Hospital Utilization:

Planning hospital facilities requires prediction of future patterns of utilization. Hospital utilization can be measured by many indicators such as hospital bed to population ratio, the number of patient days per thousand population and bed occupancy rate. However, the first two indicators has some weaknesses.

Population and hospital bed ratio in an area indicates the proportion and availability of beds, but these proportion does not indicate the utilization of hospital services. The new supply of hospital beds brings change in demand until an equilibrium is reached with the occupancy rate. This is supported by

Shain and Roemer (1959) and in Anderson(1973). The study presented data indicating that hospital utilization within a state as well as costs are strongly related to the supply of beds available to the population.

For the hospital utilization, the number of patient days per thousand population have also been used as an indicator of the use of general hospital facilities,

But Anderson (1973), referred to Feldstain and Germann(1959), pointed out that patient days per thousand population and population

per bed ratio has 70% variation. This indicates that there is no relation between two variables and population per bed ratio cannot be an appropriate indicator.

Here, it is not mentioned specifically about the hospital utilization measurement of inpatient services, in comparison of population in totality.

The size of the hospital is represented by its bed capacity and the utilization can be determined by the bed occupied in average and in terms of percentage.

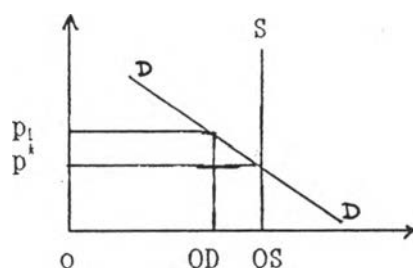
The bed occupancy rate can be measured by simple calculation and is required to ascertain the future need of either bed or hospital.

$$\text{Bed occupancy rate} = \frac{\text{Number of beds occupied in average} \times 100}{\text{Number of bed capacity}}$$

3.3 Underutilization

In terms of demand and supply, when the supply is greater than the demand, in respect of hospital beds, the supply of beds are greater than the demand and beds are utilized less than the bed capacity, may be treated as underutilization.

Figure : 3.5 Underutilization of Beds at Thana level

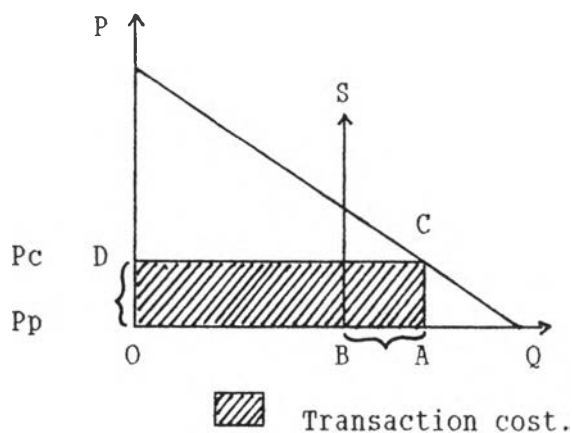


The above Figure 3.5 shows that at the Thana Health Complexes the quantity of beds supplied are greater than the demand i.e., the demand for hospital beds at the Thana health complex is less than the bed capacity p_1 price the utilization would be 100%.

3.4 Overutilization

In terms of demand and supply whenever there is overutilization, it means that demand is greater than supply. In this case, service supply of beds in the hospitals can vary from 50-250 beds but generally 100 beds, which is fixed and the demand is more than the bed capacity, which may be treated as overutilization.

Figure: 3.6 Overutilization of Beds at the District Hospital



- $OACD$ = Total transaction cost
 OA = Total patients
 OB = Number of patients on the bed
 AB = Patients on the floor
 OD = Transaction cost per patient + opportunity cost per patient

The above Figure 3.6 shows that due to the utilization of hospital bed $OACD$ is the total transaction cost for OA number of patients. OB number of patients remaining on bed and AB number of patients remain on floor, who overutilize the hospital services. So, overutilized portion is $AB = OA - OB$. P_p represents the price to the patient, in respect of hospital services the $P_p = 0$, when P_p increases to P_c the transaction cost increases and the consumer surplus decreases.

Transaction cost: Transaction cost is mainly the hospital fee, cost incurred by patient and accompanying relatives, transportation cost, cost for drugs, cost for food, Loss of income or wages of patients and accompanying relatives or attendants, opportunity cost etc. Most of the people are residing in the rural areas but they do not prefer to utilize the Thana health complex, though this health facility is nearer to them, rather they prefer to utilize district hospital, which is far away from the patient houses. If the patients utilize the Thana health complex, they would not come to the District hospital, and do not have to pay this cost. Therefore, $OACD$ = consumer cost of overutilization.

In Thana health complexes the budget is fixed, whatever might be the utilization rate the budget allocation for salary of doctors, nurses and other staff, the cost of drug, administrative cost, cost for repair and maintenance of building and equipments are the same. Overhead expenditure becomes high. Moreover, the rural patients get the services from the District hospital, which involves the cost of treatment, transportation cost of patient himself or herself or his / her relatives, cost of food, cost for accommodation, which is an economic loss for the consumer. If he /she could get the

treatment from the Thana health complex they would not have to pay these cost.

In the District hospital also the budget is fixed. In this case the number of patients is more than the bed capacity and the hospital is overutilized. The excess patients are to stay on floor of the hospital and some have to wait for admission. The patients who remain on the floor, get secondary infection, consume more drugs, stay long time in the hospital. The number of doctors, nurses and other staff have limited time to see or to take care of the patients. In that case doctors, nurses and the staff usually spend less time per patient. Considering the totality of hospital care it takes a long time to get the treatment as a result the patients are to loose wages, suffers for a long time, the attendants of the patient also loose wages and spend for food, accommodation, which is a wastage.

The following chapter discusses the impacts of underutilization of hospital beds at Thana health complex, overutilization of hospital beds at the District hospitals and attempts to develop a methodology for assessment of the impacts.